Microsoft Exchange Server

Chapter 3
Evaluating System Dependencies and Technical Factors

Planning Guide

Abstract

This chapter frames the technical issues that will impact your deployment of Exchange 2000. After you complete this chapter, you should be able to collect relevant information about your current environment that, in conjunction with your business requirements, will help you determine the preferred architecture for Exchange 2000 in your organization.

This is a preview edition of the Microsoft Exchange 2000 Server Upgrade Series. The final documentation will be available in November 2000.

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INTRODUCTION

Exchange 2000 is the first major Active Directory-enabled application to be released, and it requires a solid Windows 2000 Active Directory infrastructure. If your organization is currently using Exchange 5.5, you have an existing Exchange 5.5 architecture in place that must be considered when you plan your migration to Exchange 2000. You should have collected information about your existing infrastructure (refer to the decision process described in Chapter 2 and Job Aid 5) that you will now use to prioritize the implementation of Exchange 2000 features.

Active Directory Design Considerations

While Active Directory is required for a successful Exchange 2000 environment, Exchange 2000 must not be the sole consideration when you design the Active Directory. If you have not yet implemented Active Directory, you must plan an Active Directory structure that meets both the technical requirements of Exchange and the business requirements of the organization. Once the business units within the company realize that there is a functional directory in place that contains information about all employees, they will want to use it to meet their business objectives (such as in custom directory-enabled applications). If Active Directory is not designed with these business objectives in mind, business units may later request that you re-architect the directory to accommodate their needs, and you will find that this is not a reasonable option. Active Directory design is an important, coordinated effort. For detailed information on how to plan a useful and meaningful Active Directory structure, it is highly recommended that you consult the chapter "Designing the Active Directory Structure" in the *Deployment Planning Guide* of the Windows 2000 Resource Kit.

Resource Requirements

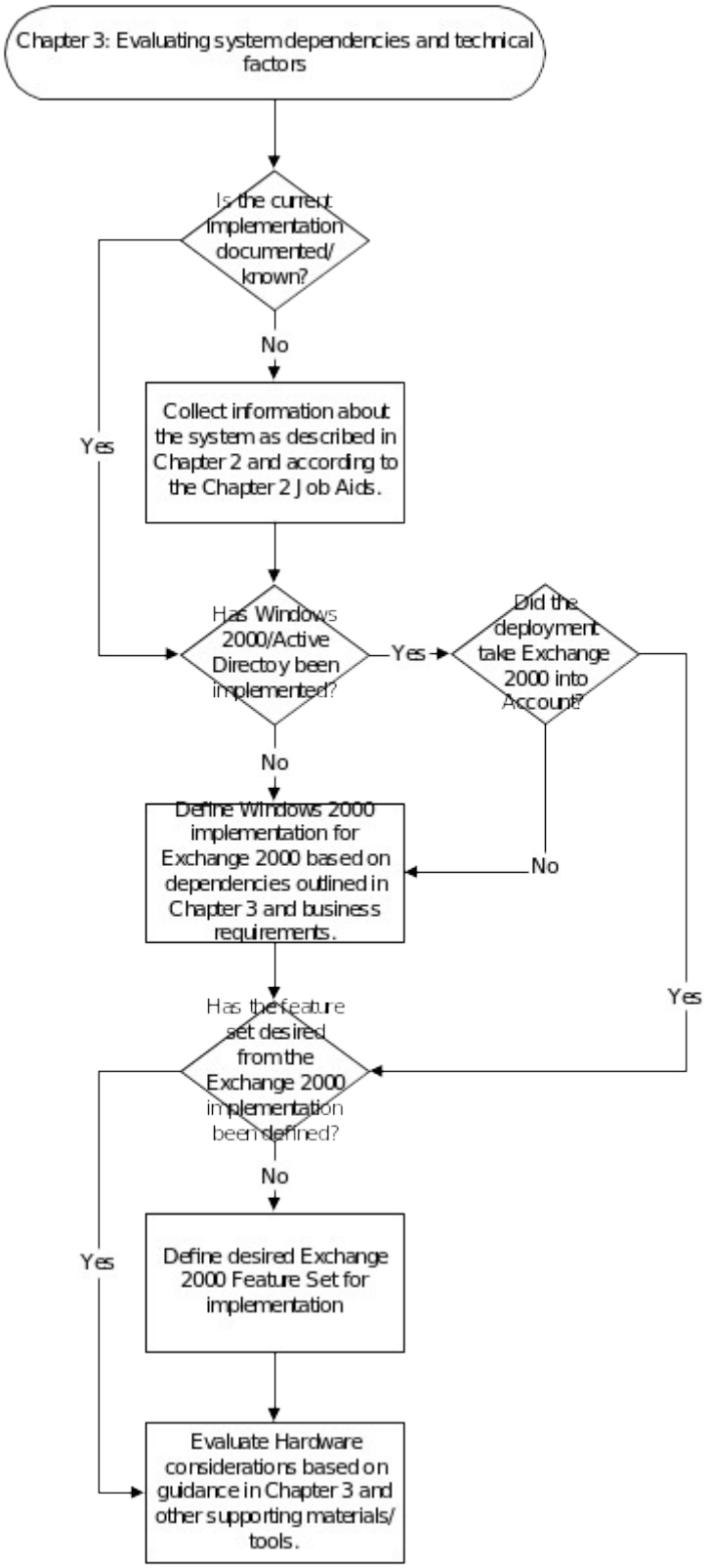
Building an Exchange 2000 messaging infrastructure requires input from several areas of the organization in addition to the people responsible for its technical management. At a minimum, the following personnel are required:

- **Executive Sponsors—**Without sponsorship from senior management, any large project undertaking will fail. Sponsorship should be obtained before proceeding with the design.
- **Active Directory Architect**—A person with Active Directory design knowledge is needed to design an Active Directory structure that will meet both the business requirements of the organization and the technical requirements of Exchange. This person must be familiar with Windows 2000 Active Directory, Exchange 5.5, and Windows NT 4.0. If your Active Directory is already implemented, this person will assist in integrating schema and other changes to support Exchange

2000.

- **Exchange Architect**—This person will be responsible for all phases of Exchange design, including routing, defining administrative groups, and creating a disaster recovery plan.

- **Network Analyst**—A person who specializes in assessing the underlying physical infrastructure is essential to the design process, especially in any environment that includes slow WAN links. This person can determine how to overcome bandwidth issues, the optimum placement for servers, maximum allowable database sizes for Active Directory replication, and the number of clients that can be optimally supported at each site.


Chapter 3: Evaluating system dependencies and technical factors
Is the current implementation documented/ known?
No
Yes
Collect information about the system as described in Chapter 2 and according to the Chapter 2 Job Aids.
Has Windows 2000/Active Directoy been implemented?
Yes
Did the deployment take Exchange 2000 into Account?
No
No
Define Windows 2000 implementation for Exchange 2000 based on dependencies outlined in Chapter 3 and business requirements.
Yes
Has the feature set desired from the Exchange 2000 implementation been defined?
No
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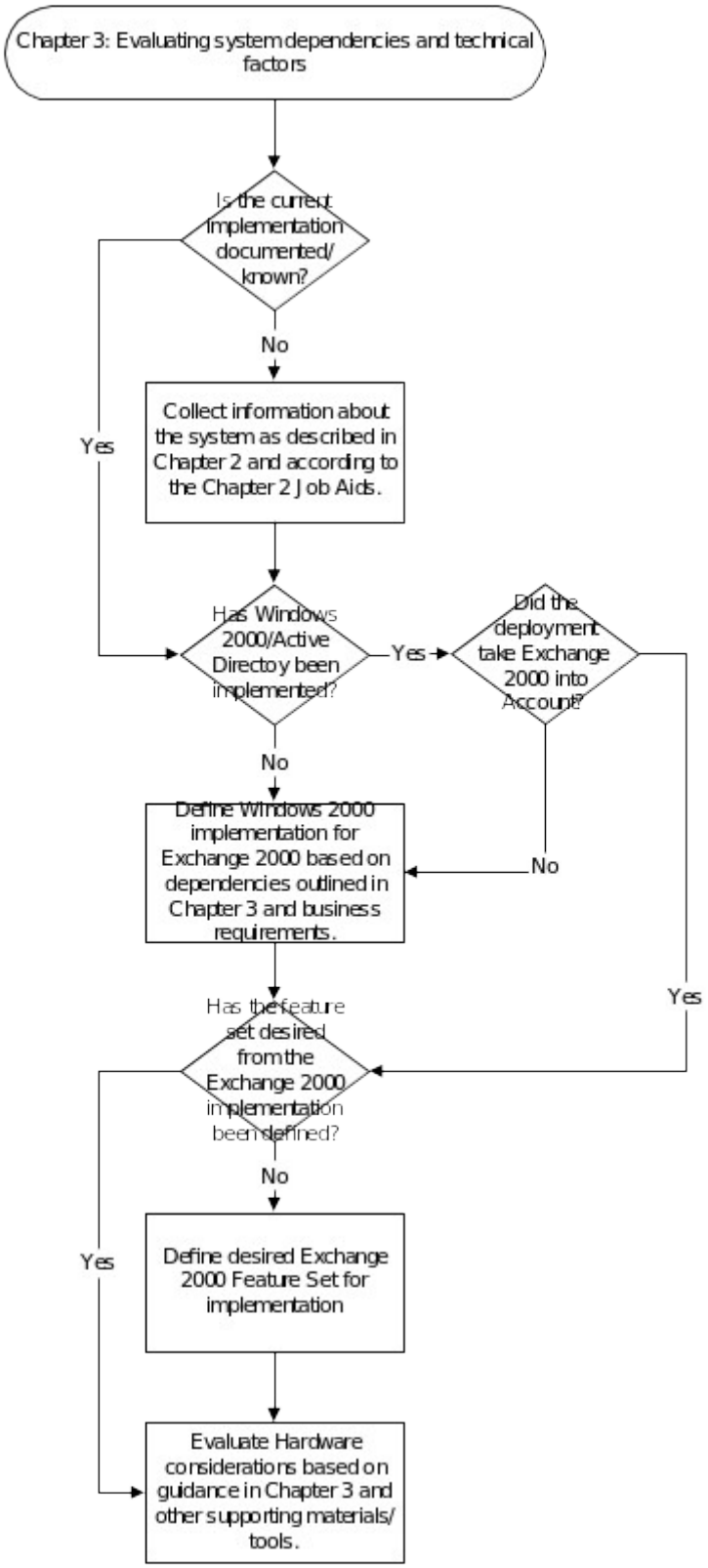
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Global Catalog servers only maintain directory information for the forest of which they are a part—all Domain Controllers (DCs) within a forest share the same Schema, Configuration Naming Context, and Global Catalog. Thus, it is important to try to keep the Active Directory design to a single forest. While this has

always been a directory design recommendation, it is vitally important for the support of Exchange 2000. Maintaining more than one forest requires maintaining more than one Exchange Organization.

Best Practice: Limit the Active Directory design to one forest whenever possible.

Global Catalog Dependencies

A Global Catalog server (GC) provides a GAL that spans multiple domains for Exchange servers and Outlook clients. Local GC access is a requirement. In most cases, this means that at least one DC in any Windows 2000 site that also contains an Exchange Server must be a GC as well. In a single domain environment, every DC can be a GC without creating serious implications, as every domain controller already contains the entire Active Directory in such a configuration.

In a multi-domain environment, you should exercise caution when taking this approach. Adding the role of GC server to a DC increases the amount of replication traffic that the server (and underlying network) must handle. If you are in the planning stages for Active Directory and want to know what type of additional replication to expect, download the Active Directory Sizer tool from

http://www.microsoft.com/WINDOWS2000/library/resources/reskit/tools/

This tool calculates the estimated size of the Global Catalog.

Best Practices:

- Monitor the CPU and memory utilization on Global Catalog Servers that are authenticating Outlook clients in regional/departmental data centers. As the number for clients per server increase during server consolidation, the load on these authentication servers increases proportionately.
- Place a Global Catalog Server in each Windows 2000 Site hosting Exchange 2000.
- Limit the number of Global Catalog Servers in a multi-domain architecture to withstand the amount of replication traffic that your WAN can sustain**.**
- Use the Active Directory Sizer tool to approximate the size of the Active Directory Global Catalog Servers for your organization. This allows you to determine Global Catalog Server hardware requirements.
- Do not run Exchange 2000 on a Global Catalog Server. For ease and efficiency in performing upgrades (for Exchange 2000 and Windows 2000 alike), it is best to keep the servers functionally separate.

Global Catalog Server placement is a critical design consideration for Exchange 2000.The Site Replication Service (SRS) and Active Directory Connector (ADC) require access to a GC. Place a GC close to the systems hosting these services to minimize network traffic.

Best Practice: Install a GC specifically for the ADC, located next to the SRS host, on the same Network segment.

Windows 2000 Domain Dependencies

For every domain in which an Exchange server is installed, you must run the command line utility DomainPrep. You must be a Domain Admin and a Local Admin to run it. DomainPrep creates a global security group (Domain EXServers), creates a domain local security group (All Exchange Servers), adds the Domain EXServers group to the All Exchange Servers group, and grants rights to the address list server.

Required Practice: Run DomainPrep on each Windows 2000 domain that will have Exchange 2000 deployed within it, or in each domain where recipient objects, such as users, contacts or groups, reside.

Windows 2000 Site Dependencies

Sites represent physical divisions of the network in Windows 2000. Devices other than DCs join sites automatically, based on their IP subnet. To make sure that the Exchange Servers belong to the proper sites, the site structure of the network must be in place before deploying the Exchange servers.

Best Practice: Define Windows 2000 sites before deployment of Exchange 2000.

Active Directory Connector

If Exchange 5.5 is to exist within the forest, the ADC must be installed to replicate Exchange 5.5 directory information in the Active Directory. Installation and maintenance of the ADC is beyond the scope of this chapter. For detailed information regarding the implementation of the ADC, refer to Deployment Chapter 2, “Configuring the Windows 2000 Active Directory for Exchange 2000.” Note that the Exchange 2000 version of the ADC (not the version that ships with Windows 2000) *must* be used when preparing for Exchange 2000. For more details, refer to Exchange 5.5 Dependencies, later in this chapter.

Preparing the Windows 2000 Active Directory Forest for Exchange 2000

Exchange 2000 installation extends the schema of the Active Directory to support:

- Mail-enabled objects
- Other properties that are used to construct the Address List on clients
- The configuration and management of Exchange 2000.

To install the first Exchange 2000 server in a forest, log on using an account that is a member of the Schema Administrators, Enterprise Administrators, and Administrators groups, and then perform the installation.

Membership in the Schema Administrators and Enterprise Administrators groups is, and should be, tightly controlled. A person who is a member of the three groups mentioned above can run the ForestPrep utility first, and then a person that is a member of both the Domain Administrators and Exchange Administrators groups can install Exchange servers into the forest. ForestPrep extends the schema with Exchange-specific classes and attributes, prompts for an organization name, creates it within Active Directory, and assigns Exchange Full Administrator permissions for a specified account. If an Exchange 5.5 SP 3 server already exists within the forest, ForestPrep also prompts you to join that organization.

ForestPrep needs to be run only once within any forest. The ForestPrep process may take some time; the actual amount of time is dependent on several factors, including the number of objects in Active Directory, the number of GCs, and the quality of the hardware that is performing the update. The initial update typically takes one to several hours, and full replication can take several hours to several days (an extreme case).

ForestPrep extends the Active Directory Schema and builds the required containers and objects to support Exchange 2000. GCs can be offline for 50 percent of the tombstone life (which by default is 90 days). This

means that the GC can be offline for 45 days without causing problems.

Best Practice: To prevent excessive GC rebuild operations, schema update operations can be performed on a GC that has been taken offline with a loopback applied. Once brought back online, the Schema master will immediately enforce GC rebuilds across the network. These factors must be considered when you are scheduling the time that the offline SM is brought back online.

Best Practice: Update the Windows 2000 schema using ForestPrep as early as possible in the Windows 2000 deployment, to ensure that GCs are optimally available for client operations.

Core Operating System Dependencies

Exchange 2000 depends on Windows 2000 for protocol management. Exchange 5.5 allowed the mail server to control protocols, whereas Exchange 2000 implements new protocols using extensions to Internet Information Services (IIS). Note that MAPI is still supported for legacy clients.

Internet Information Server (IIS) Dependencies

IIS must be installed on the Exchange Server prior to Exchange installation. Both the SMTP and NNTP protocols must be installed. These options can be added through **Add/Remove Programs** in the **Control Panel**.

DNS

Since Exchange 2000 is an SMTP-native messaging system, proper DNS information must be in place for Exchange to function properly. This includes correct MX record setup and providing the Exchange server with the addresses of the desired DNS servers.

Best Practice: Deploy a DNS infrastructure with appropriate service records registered in appropriate child domains.

WINS

Although Exchange and Windows 2000 prefer DNS for name resolution, most networks continue to have clients that require NetBIOS; this includes Outlook 2000 and earlier clients, as well as Exchange 5.5. Do not remove WINS unless you are positive that there is no need for it anywhere on the network.

Note: Outlook can be configured to use DNS only, but this is not the default client behavior. If your organization decides that the maintenance of WINS is too costly, you can use a script that modifies select registry entries to reconfigure the Outlook clients.

EXCHANGE 5.5 DEPENDENCIES

Best Practice: Keep a WINS infrastructure active until all clients are revised to take advantage of Windows 2000 DNS.

If existing Exchange 5.5 servers are to be upgraded to Exchange 2000, they should be backed up first (along with the databases). The following Exchange 5.5 dependencies and considerations must be accounted for before installing Exchange 2000.

Exchange Software Requirements

Your existing Exchange 5.5 servers should be upgraded to Service Pack 3 or later. This is a requirement for upgrades and installation of the ADC.

The Active Directory Connector (ADC)

Exchange 5.5 can automatically synchronize its directory information with the NT 4.0 SAM database. However, this is not possible in Windows 2000. The ADC must be installed for Exchange 5.5 to bi-directionally replicate directory information to the Windows 2000 Active Directory. Only the Exchange 2000 version of the ADC is supported for this synchronization. A version of the ADC ships with Windows 2000, but this version cannot replicate the Exchange names from the Exchange 5.5 directory to Active Directory. Additional improvements to the Exchange 2000 version of the ADC include a new Public Folder Connection agreement, an inter-organizational option, and improved performance. This version is included on the Exchange 2000 CD. For a more detailed discussion of the ADC and its use, see Deployment Chapter 2, “Configuring the Windows 2000 Active Directory for Exchange 2000.”

The Recipient Update Service (RUS)

When you install Exchange 2000 on a new domain or when you have mail-enabled objects on that domain, you need a Recipient Update Service (RUS) to stamp the Proxy Addresses for the mail-enabled objects. RUS runs under the System Attendant (MAD) that identifies any mail-enabled object (or mailbox-enabled object) on the domain and synchronizes attributes for these objects every time additional entries are created or an existing entry is modified. There are two flavors of the RUS: one that runs on the Domain naming context (Domain RUS), and one that runs at the Enterprise Configuration level of Active Directory (Enterprise RUS). Usually, mail-enabled objects are thought of as user or groups, but the Store, the System Attendant, and the MTA are also mail-enabled: they are stored in the Configuration Naming Context (Enterprise Configuration). By default, when you install the first Exchange 2000 in your forest, it creates the RUS for the Enterprise Configuration. After the installation is complete and additional Exchange 2000 servers have been

added, you can change the responsible server if you want. The RUS for Enterprise Configuration performs changes only when you change one of the Exchange 2000 Recipient Policies, such as adding a new email address, or adding or removing an Exchange 2000 server. The Domain RUS executes every time that a user, a group or a contact is created, deleted, or modified.

Best Practice: For large Exchange 2000 installations, isolate the Enterprise RUS service on a separate computer near a GC and ADC/SRS directory bridgehead server, so that changes are replicated quickly and have ample processing power to complete.

The Site Replication Service (SRS)

To complete the migration from Exchange 5.5 to Exchange 2000, Admin/Routing Groups must be continually synchronized with their Exchange 5.5 equivalents, the Exchange site. The Site Replication Service (SRS) is anchored in Active Directory and used by Exchange 2000 and the Exchange 5.5 directories. This service acts like an information exchange point between Active Directory and legacy Exchange 5.5 directories, with the ADC bi-directionally translating Administrative Groups representation into sites. When examining the resulting topology with an Exchange 5.5 Administrative console, it appears that the Exchange 2000 Admin/Routing groups are Exchange 5.5 sites and the Exchange 2000 servers themselves are acting just like a configuration/recipients replication partner to the existing 5.5 servers.

The SRS is responsible for replicating Exchange 2000 topology changes to the Exchange 5.5 directory, so that Exchange 2000 servers operating in mixed 5.5/2000 sites will be aware of the other servers in the architecture. Therefore, a SRS should be installed on the first Exchange 2000 server in an Admin/Routing or site (either upgraded or a fresh installation), or any directory replication bridgehead server upgraded to Exchange 2000.

Best Practice: Install a SRS on the first Exchange 2000 server in an Admin/Routing Group or Exchange 5.5 Site. Install an SRS on the directory replication bridgehead server for each mixed mode Exchange 5.5/2000 site.

Exchange 5.5 Service Account

Exchange 2000 no longer requires the use of a service account to allow for basic exchange maintenance; instead, it leverages the local system account data on each server. However, the Exchange 5.5 service account username and password must be known for interoperating between the two versions of Exchange. Knowledge of this username and password is also required during the configuration of the ADC.

If the Active Directory Migration Tool (ADMT) is used to migrate the Exchange Service Account to Active Directory, the ADMT resets the password for the account. This password should be changed back to the previous password that was active under NT 4.0 or the Exchange 5.5 services will stop.

Best Practice: Do not migrate the Exchange 5.5 Service Account using the Active Directory Migration Tool.

Exchange Databases

Before migrating an Exchange 5.5 user server, the databases on the server should be backed up and an integrity check (using isinteg.exe and the DS/IS consistency checker) should be performed on the databases to ensure that they are free of corruption. Exchange 2000 installation on an Exchange 5.5 Server that has corrupted databases will likely fail or have other unpleasant problems. These problems can range from loss of data to an inability to upgrade.

Best Practice: Ensure that the databases on Exchange 5.5 servers are free of corruption using the DS/IS consistency checker; repair any corruption with the isinteg.exe tool. Consider moving mailboxes between an existing Exchange 5.5 server and a newly installed Exchange 2000 server when new hardware is being installed for Exchange 2000.

Public Folder Permissions

When upgrading servers that hold a Public Folder (PF) store, the owners of the Exchange 5.5 PF must exist in Active Directory prior to the upgrade. If the owners of the PFs are not already in Active Directory, access will be denied and owners will not be able to administer their folders. Access Control Lists (ACLs) assigned to PF resources are based on Active Directory security principals. If the Active Directory security principal is not present prior to the migration, the migration tools cannot identify a security principal to assign folder ownership to. Therefore, the upgrade will not permit any access to the folder until the administrator has reset the permissions on the folder. This prevents unauthorized access to potentially sensitive information. To ensure permission and access consistency, use the PFAdmin.exe tool from the Exchange 2000 Resource Kit to generate a list of all relevant PF Permissions before upgrading the first server to Exchange 2000.

Best Practice: Run the PFAdmin.exe tool from the Exchange 2000 Resource Kit to ensure that public folder permissions are known prior to the upgrade of the Exchange 5.5 server. Migrate any PF owners to Active Directory prior to upgrading the server to Exchange 2000.

HARDWARE
CONSIDERATIONS

The Exchange LDAP service

Many organizations implement Exchange 5.5 on NT 4.0 DCs. A special consideration for upgrading these servers to Windows 2000 is that Active Directory uses the default LDAP port 389 to perform LDAP operations. This conflicts with the Exchange LDAP port. Anyone upgrading Exchange 5.5 servers to Windows 2000 should first change the Exchange LDAP port to a different port. In many cases, port 390 is open, although you should confirm this on an individual basis.

To change the LDAP port:

1. Open the Exchange Administrator program.
2. Expand the **Site** container.
3. Expand **Configuration.**
4. Expand **Protocols**.
5. Double-click **LDAP (Directory) Site Defaults**.
6. On the **General** tab, change the port number and click **OK**.
7. Stop and *restart* ***Microsoft Exchange Directory*** using **Control Panel/Services**.

HARDWARE CONSIDERATIONS

Note: The LDAP port used on Windows 2000 GCs and DCs cannot be changed from TCP 389. Windows 2000 requires exclusive access to this port.

Hardware improvements improve the performance of any application being served. The following section describes special hardware considerations for Exchange 2000.

System Memory

The Exchange Installable File System (ExIFS) exposes Exchange data as a file share. This has numerous benefits, with one caveat—the ExIFS increases the amount of data that Windows 2000 caches. Therefore, any server with a large mailbox store must also have a large amount of RAM.

System Storage (Disk Drives)

It is useful to place each storage group on its own volume. If you follow this approach, a drive loss will result in only one storage group going offline. However, if you are using a cluster, do not host more drives than supported by the fail-over mechanism. If you do host more drives than the supported number, some storage groups will not come back online if fail-over occurs.

Exchange should be installed on a drive that has a large amount of available disk space. The SMTP queues will be housed on this drive. In times of heavy mail usage, there must be sufficient space to hold the queued messages.

System Processing Resources

If an existing Exchange 5.5 server is to be upgraded to Exchange 2000, monitor the total processor usage before the upgrade takes place. If the CPU runs at anywhere from 25 to 30 percent utilization, this will probably be a sufficient processor for Exchange 2000 (assuming the roles and usage of the server remain the same after the upgrade). If the processor is being utilized more than this, consider either upgrading the machine or migrating the Exchange 5.5 server instead of upgrading it.

In other words, if the server is already stressed under Exchange 5.5, it will not be able to handle the load of Exchange 2000.

Cluster Considerations

Clustered server environments are becoming increasingly common. As Service Level Agreements (SLAs) reach for higher availability, and the dependence of normal business functions on server applications becomes